# THE MONTHLY REVIEW,

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ART. I. PHILOSOPHICAL TRANSACTIONS *of the Royal Society of London.* Vol. LXXII. For the Year 1782. Part I. 4to. 8s. ſewed. Davis.

PAPERS *relating to* CHEMISTRY.

Article 15. *Continuation of the Experiments and Obſervations on the ſpecific Gravities, and attractive Powers, of various ſaline Subſtances:* By Richard Kirwan, Eſq; F. R. S.

IN this Article Mr. Kirwan proſecutes his curious and profound inveſtigations with ſingular addreſs and ingenuity. After aſcertaining, in a very ingenious manner, the quantity of pure acids requiſite to ſaturate the mineral and volatile alcali, calcareous earth, magneſia or muriatic earth, and that of alum; he diſcuſſes one of the moſt profound and intereſting ſubjects of chemiſtry: we mean the nature of *phlogiſton*, and even the quantity or *weight* of this principle, that is contained in ſeveral compounds; particularly in *nitrous air*, *fixed air*, *vitriolic air*, *ſulphur*, and *marine acid air*. We do not add, *inflammable air*; for the capital reſult of the Author's reſearches into this ſubject is—that perfectly pure *inflammable air and phlogiſton are one and the ſame ſubſtance.*

*Phlogiſton*, the Author obſerves, exiſts in metals and various other ſubſtances, in a *concrete* or *fixed* ſtate, in the ſame manner as fixed air, or the aerial acid, exiſts in marble; where, he obſerves, that this laſt fluid is nearly of equal denſity with gold: but neither can phlogiſton, nor fixed air, be exhibited in a concrete ſtate, ſingle or uncombined with another ſubſtance; for the inſtant that they are by any means diſengaged from the bodies with which they had been combined, and by which they had been fixed, they aſſume a fluid and elaſtic ſtate, and reſpectively appear under the forms of inflammable air and fixed air.

On this occaſion, the Author, availing himſelf of Dr. Black's theory of *ſpecific fire*, accounts for the manner in which both the aerial acid, and phlogiſton, undergo this great change in their conſtitution; or are rendered fluid and elaſtic, by a union with the ſame principle, elementary fire. Paſſing over the Author's proofs and illuſtrations relative to this part of his ſubject, we muſt be content to explain his general doctrine in a few words.

When the aerial acid, combined, in its concrete and unelaſtic ſtate, with marble, is expelled from thence by a ſtronger acid, the vitriolic for inſtance, and is volatiliſed and rendered elaſtic; a *double decompoſition* is ſuppoſed to take place. The vitriolic acid parts with a ſufficient quantity of its ſpecific fire to the fixed aerial acid; which, by this addition, immediately becomes a volatile and aerial ſubſtance, and appears under the modification of fixed air: and the vitriolic acid immediately combining with the calcareous earth forms another compound. In the ſame manner, the vitriolic acid, acting upon iron, parts with a portion of its *ſpecific fire* to the phlogiſton of the iron; which, on its union with this principle, immediately aſſumes an elaſtic ſtate, and flies off under the form of *inflammable air*; while the vitriolic acid forms another compound, by combining with the martial calx.

Among various other inſtances brought to prove the identity of inflammable air and phlogiſton, the Author, with very great propriety, in our opinion, adduces the precipitation, or, as it may be called, the reduction of one metallic earth, by the phlogiſton of another metal. The experiment itſelf is well known, and is not a *unique*; but it ſo well illuſtrates, we may ſay proves, the truth of the preſent doctrine, that, inſtead of abridging, we ſhall enlarge upon, what the Author ſays upon the ſubject.

When a piece of iron is immerged in a ſaturate ſolution of copper in the vitriolic acid, it is well known that, though the acid undoubtedly acts upon and diſſolves the iron, no effervescence ariſes, nor does any *inflammable air* appear; though that elaſtic fluid is always generated when iron is ſingly expoſed to the action of that acid. The fact is, that the *phlogiſton* of the iron, inſtead of aſſuming the *modification of inflammable air*, even for an inſtant, enters peaceably into the calx of the copper, under its *other modification of phlogiſton*; and the earth of the copper, in conſequence of this union, is precipitated in a metallic ſtate.

In three words—The *very thing* which, had it eſcaped from the iron through the liquor, might have been actually caught under the form of *inflammable air*, now paſſes into the earth of the copper; and, under the form of *phlogiſton*, gives it all the qualities of a metal. But the ſubſtance which converts metallic earths into metals is allowed by all (who allow the exiſtence of the principle itſelf)

itself) to be phlogiston: inflammable air, therefore, is phlogiston.

The preceding parallel drawn between fixed air and phlogiston may be extended to the illustration of this case. No signs of effervescence appear when, in the preparation of magnesia, a mild alcali is added to a solution of Epsom salt; and though the fixed air of the alcali is undoubtedly expelled from it by the vitriolic acid in the Epsom salt, it does not, even for an instant, assume its aerial form: on the contrary, it quietly passes, in its concrete or non-elastic state, into the precipitated magnesia; in the very same manner as the phlogiston of the iron moved into the earth of the copper in the preceding case.—This subject is more largely discussed in the Appendix to *Dr. Priestley's Experiments, &c.* vol. ii. p. 392; and in the Appendix to his 3d volume, p. 393.

From a variety of other considerations the Author infers, that 'inflammable air is the principle that metallizes metallic earths: and if metals contain only a specific earth and phlogiston, inflammable air certainly contains nothing else but phlogiston.'—But we need not extract more from this part of the present article on this particular subject: as, from a PS. subjoined to it, it appears, that the Author has been informed that Dr. Priestley has, since the publication of his last volume, directly and satisfactorily ascertained the identity of inflammable air and phlogiston.—In a jar, containing pure inflammable air, he has, it seems, by means of the solar heat, *reduced* the calces of iron, copper, lead, and tin. It may, indeed, be alleged, that these experiments prove only that inflammable air *contains* phlogiston: but it is to be observed, that there is no decomposition of the inflammable air in this case; for whether inflammable air be a simple or a compound substance, it appears evidently to restore the calces to their former metallic state, by being received into them *in toto*, or in its *whole substance:* for the inflammable air, that remains in the jar after the process, is found, we are told, to be as inflammable, or pure, as before this absorption of the greatest part of it.

The Author concludes his observations on phlogiston by affirming, that he has already distinguished eight different states of this substance; viz. from its most *rarefied* known state, or that of inflammable air, to its most *condensed* state, or that in which it is combined with metallic earths.——'Each of these, says he, differs from the other by the portion of elementary fire they contain: this quantity being, as far as I can judge directly, as the rarefaction of the phlogiston; but these researches are foreign to my present subject. I shall only remark, that phlogiston, in a state perhaps 100 times rarer than inflammable air, and consequently containing much more fire, *may possibly constitute the electric fluid.*'

As the weight of inflammable air is known, Mr. Kirwan employs that knowledge, as furniſhing an eſſential *datum* towards aſcertaining the quantity or weight of phlogiſton contained in various ſubſtances.—To give one example—100 cubic inches of nitrous air (which weigh 39.9 grains) contain 6.7 *grains of phlogiſton*, and 33.2 grains of nitrous acid.

Mr. Kirwan next proceeds to aſcertain the quantity of phlogiſton contained in fixed air. On this occaſion he enters on a minute inveſtigation of the nature and origin of this fluid. Reaſoning on a great variety of experiments that have been made, relative to this ſubject, he maintains the opinion which he had before advanced, in the notes annexed by him to Dr. Forſter's tranſlation of M. Scheele's treatiſe on fire;—that *fixed air* is a compound ſubſtance, conſiſting of *reſpirable air* and *phlogiſton*; or that phlogiſton converts pure or reſpirable air into fixed air. The numerous obſervations which the Author has collected, to prove the truth of this ſingular propoſition (which, however, has likewiſe been maintained by others) evince his extenſive acquaintance with the ſubject, and his addreſs in the application of the experiments to the ſupport of his hypotheſis; though ſeveral of them may be ſatisfactorily explained on different principles. The reſult of his analyſis of fixed air is, that 100 cubic inches of that fluid contain 8.357 grains of phlogiſton, and that the remainder is elementary air.

Dr. Prieſtley, in ſeveral parts of his writings, particularly in his laſt volume, [*Experiments and Obſervations*, &c. vol. ii. p. 108.] has controverted the hypotheſis here maintained by Mr. Kirwan; and which had, by many perſons, very unaccountably been aſcribed to him. It now appears, however, that the Author, having read this account of the nature of fixed air to Dr. Prieſtley, 'had the ſatisfaction to find it met with his entire approbation, which he authorized him to mention, notwithſtanding what he had advanced to the contrary in his laſt publication.'—Nay, we have been lately informed, that Dr. Prieſtley, ſince the publication of this paper, has had further reaſons for adopting this hypotheſis; in conſequence of his having actually produced fixed air from two ſubſtances, one of which is known to furniſh *only* pure air, and the other *only* phlogiſton.

Article 2. *Nova Experimenta Chemica quæ ad penitiorem Acidi e Pinguedine eruti cognitionem valere videntur. Scribebat* D. Laurentius Crellius.

In this Article the Author continues the account of the experiments made by him with this new acid. [See M. Rev. Vol. LXIV. April 1781, p. 266.] They are very numerous; but we ſhall confine ourſelves to a few which appear the moſt intereſting.

Not-

Notwithſtanding what is affirmed in the page of our Review above referred to, it does not appear that the Author has ſucceeded in diſſolving gold, while in its metallic ſtate, with this acid ſingly. He might poſſibly be deceived by the golden colour which this acid aſſumes, even when alone, after about one half of it has been drawn off in diſtillation. He ſucceeded however in diſſolving a calx of that metal.

Employing a precipitate of gold made by ſalt of tartar, and digeſting eight grains of it, during a month, with half an ounce of the animal acid; it was evident that, though a conſiderable part of the calx remained at the bottom of the veſſel, a ſenſible part of it had been diſſolved: for, on adding to the clear fluid a little of the volatile tincture of ſulphur, a portion of gold fell down, in the form of a darkiſh yellow precipitate. A part of the ſame clear ſolution, likewiſe, being evaporated, exhibited irregular yellow cryſtals.

On the addition of a ſmall portion of nitrous acid to the animal acid, the Author procured a ſolution of gold, in its metallic ſtate. When to 80 drops of animal acid he added only 20 of ſpirit of nitre, he obſerved evident ſigns of a gentle ſolution. On adding 20 drops more of the nitrous acid, and employing heat, a leaf of gold was totally diſſolved. This experiment, ſays the Author, evinces a notable difference between the new acid, and that of ſalt: for it is evident that gold cannot be diſſolved by a mixture of two parts of ſmoking marine acid, and one of aqua fortis.

The Author proceeds to relate the reſults of various experiments made with this acid, and the different metals and ſemimetals, as well as ſeveral neutral ſalts: but for his account of theſe numerous trials, we muſt refer our chemical Readers to the Article itſelf.

Article 1. *Relazione di una nuovo*, &c. *Account of a new Kind of Rain.* Written by the Count de Giſeni, an inhabitant of the 3d Region of Mount Ætna, &c.

This article contains the chemical analyſis of 'a coloured cretaceous grey water,' which fell in a ſhower of rain, that extended over the fields, about 70 miles, in a right line from the top of Ætna. On evaporating a portion of it, and *touching* it (to uſe the language of the Tranſlator) with vegetable alcaline liquors [ſolutions of fixed vegetable alcali] and mineral acids; a ſlight effervescence was occaſioned by the latter. Syrup of violets being added to it, had its colour changed to a pale green. Hence the noble Author was perſuaded that it contained what he calls a 'calcareous ſalt.' By this term we afterwards learn, that he means 'a marine *ſalt* combined with a calcareous ſubſtance' by a violent heat. We ſuppoſe the Author underſtands, marine *acid* combined with calcareous earth. The earth left on the total evaporation of the water, being calcined, was found

found to contain iron in a metallic ſtate. On the whole—for our noble obſerver does not appear to be a profound chemiſt—we may infer, that the ſolid contents of the rain in queſtion were the effects of a volcanic eruption.

Article 6. *An Account of ſome Scoria from Iron Works, which reſemble the vitrified Filaments deſcribed by Sir William Hamilton*: By Samuel More, Eſq.

In the 70th volume of the Philoſophical Tranſactions, Sir William Hamilton, treating of an eruption of Mount Veſuvius, gives an account of certain long filaments of vitrified matter, like ſpun glaſs, which were mixed with and fell with the aſhes. The origin and nature of theſe curious filaments are explained by the Author of this Article; who has preſented the Society with a ſpecimen of ſome *ſlag*, or vitrified cinder, taken from one of the largeſt works in England for ſmelting iron; and which, by means of the ſtrong blaſt of air from the bellows, has been drawn out, while in its fluid ſtate, into cobweb-like threads (ſome of them 10 or 12 feet in length) which being driven upwards by the blaſt, fix themſelves to the beams and other parts of the bellows room. They are ſo extremely ſlender, as to reſemble cotton in appearance; but, being examined with a microſcope, are found in all reſpects ſimilar to thoſe deſcribed by Sir William Hamilton; which are undoubtedly formed of the melted *lava*, ejected from the mouth of the crater, and probably drawn out into threads, by the force of thoſe violent torrents of air which muſt be required to ſupport ſo intenſe a body of fire as that of the volcano.

## ELECTRICITY.

Article 16. *Del modo di render*, &c. *Of the Method of rendering very ſenſible the weakeſt natural or artificial Electricity*: By M. Alexander Volta, Profeſſor of Experimental Philoſophy in Como, &c. &c.

There are few philoſophers who have contributed more largely to the improvement of electricity, and indeed of ſome other branches of philoſophical knowledge, than the very ingenious Author of this Article; who here gives us ſome electrical obſervations of a curious and ſingular nature: particularly the deſcription of a ſimple apparatus, by means of which, the ſmalleſt, and otherwiſe imperceptible, degrees either of natural or artificial electricity are rendered ſenſible. What the microſcope effects, in bringing to our view bodies otherwiſe totally inviſible, is performed by this *electrical magnifier*, with reſpect to electricity; by its rendering ſenſible ſuch ſmall quantities of that fluid, as would otherwiſe wholly eſcape the notice of our ſenſes. Nor is this a mere matter of barren curioſity only; but may—it will ſoon appear that it has already—let us into ſome of the ſecrets of nature's operations, particularly reſpecting meteorology.

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The apparatus, by which theſe effects are produced, is no other than the Author's well-known *Electrophorus*; the reſinous coat of which ought to be exceedingly thin (not perhaps above the 50th part of an inch in thickneſs); and its ſurface, as well as that of the metal plate adapted to it, ſhould be as plain and as ſmooth as poſſible.

When the ſky is perfectly clear, and free from electrical clouds, ſo that an inſulated conductor, fitted up to obſerve the electricity of the atmoſphere, does not exhibit the leaſt ſign of electricity, by even attracting the fineſt thread; if a temporary metallic communication be made by means of a wire between the atmoſpherical conductor and the metal plate, lying on the reſinous ſurface; and this communication be ſuffered to ſubſiſt for *a certain time:* on removing the wire, the metal plate will, on being lifted up, exhibit evident ſigns of electricity, by attracting light bodies, and giving ſparks. In this caſe it is ſometimes found neceſſary to preſerve the communication of the *electrophorus* with the atmoſpherical conductor even 8 or 10 minutes. But if the atmoſpherical conductor alone be capable of barely attracting a light thread; the communication above mentioned need to laſt a few ſeconds only: in which time the metal plate will receive, and, as it were, condenſe ſuch a quantity of electricity, as to dart even a ſtrong ſpark.

The effects produced by this apparatus appear as extraordinary in diſcovering the preſence of artificial electricity, when it is ſo weak as to be ſcarce or at all perceptible by any other means. Theſe appearances too are connected with a hitherto unobſerved property of what may be deemed a new claſs of bodies, ſuch as marble, dry wood, &c. and which may be called *ſemi-conductors*, or *half-conductors*. In this caſe, the reſinous plate is not wanted:—but the relation of one experiment will beſt explain our meaning.

Let a Leyden vial be charged, and then diſcharged; ſo that it will ſcarce affect a light thread: or—as we have varied the experiment, in order to obviate certain objections—let an uncharged Leyden vial be brought to the conductor of an electrical machine; ſo as to receive from it only two or three moderate ſparks. If the metal plate only of the *electrophorus* (or *condenſer*) be placed on a dry marble ſlab, a table, or dry piece of wood, or any other imperfectly conducting ſubſtance; and the knob of the vial be made to touch the metal plate, or, in ſome caſes, to paſs over its ſurface; the latter, on being lifted up, by its inſulating handle, will be found to be highly electrified, ſo as to give very ſtrong ſparks: and this it will do repeatedly for ſome time, on alternately applying the knob of the vial to the metal plate, and then lifting up the latter from the ſlab, and examining it.

This method of *huſbanding* and condenſing ſmall quantities of electric matter, ſo as to procure ſtrong ſparks by means of a vial which is not ſufficiently charged to give a ſingle perceptible ſpark, is peculiarly applicable to the firing and lighting the Author's inflammable air-piſtol and lamp: eſpecially if the operator be provided with one of Mr. Cavallo's electrical pocket vials. Theſe vials will retain a *ſenſible* charge for ſeveral days; and an *inſenſible* one for weeks, or months. Even in this laſt caſe, when the electricity of the vial appears to be extinct; the Author, with his *condenſer*, is enabled to procure ſparks from it, ſufficient to fire the inflammable-air piſtol.

Mr. Cavallo, reaſoning on the phenomena of the Author's *condenſer*, has carried this matter ſtill further; ſo as greatly to increaſe the *magnifying power* of the inſtrument, by employing another in addition to it. When the electricity, even of the condenſer itſelf, is ſo ſmall, as not to affect an extremely ſenſible electrometer, he produces a ſenſible degree of electricity, by applying it to another, but ſmaller metal plate, or *condenſer*, placed likewiſe on marble, &c. and not exceeding the ſize of a ſhilling. M. Volta does not think that he ſhould exaggerate, were he to affirm, that, by means of both theſe *condenſers*, the intenſity of the original ſtock of electricity is increaſed 1000 times.

We have not room to explain the theory by which M. Volta accounts for theſe phenomena. It is founded on ſome curious obſervations and experiments of his, on the *capacity* of ſimple *conductors*, compared with that of a Leyden vial (or a *non-conducting* coated ſurface) which he publiſhed in a philoſophical Journal at Milan, in the year 1778. He there ſhews, that the *capacity* of 16 ſquare inches of coated ſurface (in a Leyden vial, or glaſs plate coated), is equal to the capacity of a conductor made of ſilvered, wooden, cylindrical rods, and nearly 100 feet long; the capacity of which is ſo great, that its *ſpark* occaſions a ſhock conſiderably ſtrong. It will be ſufficient for us to obſerve, that the phenomena of the *condenſer* depend on this circumſtance—that a metal plate, or other conducting ſubſtance, poſſeſſes a much greater capacity for acquiring and preſerving electricity, when ſupported by marble or other imperfectly conducting bodies, than when it is perfectly inſulated.

But one of the moſt curious diſcoveries, in our opinion, which the Author has made with this delicate *electrical teſt*, is his having ſucceeded in exhibiting, by its means, electrical phenomena, and even ſparks, produced by the *evaporation* of liquids, *combuſtion*, *effervescence*, &c. To account for the manner in which the clouds acquire their electricity, many experiments had been made by others, as well as the Author, but without ſucceſs; notwithſtanding Dr. Franklin's luminous experiment of

of the ſilver can and chain [See his *Experiments*, &c. Letter 12, p. 121.], by which he attempted to explain (it now appears, on very juſt grounds) by what means the electricity of the clouds was produced. It is now evident, that their failure in this inquiry was occaſioned, not by an erroneous theory, but, through the want of an inſtrument ſufficiently delicate to detect ſmall or evaneſcent quantities of electricity. Without reciting the various circumſtances neceſſary to be attended to, in the conduct of theſe delicate experiments, we ſhall only relate the principal reſults.

The firſt trials in which the Author was ſucceſsful were made at Paris laſt year, in company with *M. Lavoiſier*, and *M. de la Place*. Chafing-diſhes, containing burning charcoal, were placed on a large inſulated metal plate; and a communication was then formed between it and the condenſer, laid on a piece of marble. After a proper interval of time, the metal plate of the *condenſer* being lifted up, was found, on preſenting it to Mr. Cavallo's electrometer, to have acquired *negative electricity*. Inſtead of the chafing-diſhes, four veſſels containing iron filings were placed on the inſulated plate. Diluted vitriolic acid being poured into them, and a ſtrong efferveſcence excited, the *condenſer* not only charged the electrometer with *negative* electricity, but gave a *ſenſible ſpark*. Electrical appearances likewiſe occurred, by means of the efferveſcences in which fixed air and nitrous air are produced.

At this time, the Author's experiments on the *evaporation of water* were not perfectly ſatisfactory; but he afterwards ſucceeded in London, on uſing the expedient of throwing water on the lighted coals contained in an inſulated chafing-diſh. After this he met with equal ſucceſs, on throwing only a ſpoonful of water on three or four ſmall coals burning in an inſulated crucible. In theſe caſes, the *ſudden* evaporation of the water never failed to electrify the chafing-diſh *negatively*, ſo as to render the electricity ſenſible, even by means of the ſimple electrometer, without having recourſe to the *condenſer*; though on uſing that inſtrument the effects were greater, ſo as that ſparks were obtained. We ſhould imagine that the electrical appearances would be greatly increaſed, ſo as to produce a ſtrong ſpark, by giving water an extraordinary degree of heat, in a *Papin's digeſter*, and then *ſuddenly* giving vent to the vapour: as, in the caſe of the common, ſlow evaporation, the ſlight degree of electricity which is generated is diſſipated nearly as faſt as it is produced, in conſequence of the unavoidable imperfection of the inſulation.

## Miscellaneous Articles.

Art. 10. *Account of an improved Thermometer*: By Mr. James Six.

It is ſcarce poſſible, without the aſſiſtance of a figure, to give a clear

clear idea of this inſtrument: though perhaps we may ſucceed in explaining the ingenious manner in which the principal effect, for which it is conſtructed, is produced. The intention is to aſcertain the greateſt degree of heat and cold that has happened in the courſe of 24 hours, in the abſence of the obſerver. It is properly a ſpirit thermometer; though mercury is employed in it, for the purpoſe of ſupporting a certain index. The tube in which the mercury moves is of the form of a U, and contains an index in the cavity of each ſide or leg. This index conſiſts of a ſhort piece of glaſs tube, uſed as a *float*, and which is adapted to the bore of the curve thermometrical tube, ſo as to move freely in it. This float contains a piece of *ſteel* wire in its cavity; the uſe of which will ſoon appear. From its upper end riſes a ſpring of glaſs, of the fineneſs of a hair; which, being ſet a little oblique, preſſes lightly againſt the inner ſurface of the thermometrical tube.

Suppoſing the index, on one ſide, to float on the ſurface of the mercury, the latter, when it riſes, carries it up along with it. When the mercury, after having attained its greateſt height, deſcends, it leaves the index behind it: becauſe its ſituation in the tube is preſerved, by means of the preſſure of its glaſs ſpring; the extremity of which points out the greateſt *heat*, on a ſcale placed parrallel to the tube. On the contrary, when the mercury has deſcended to its loweſt ſtation on the ſame ſide, during the intervals of obſervation, the index, or float, on the other ſide, is proportionably elevated, and ſhews the obſerver the greateſt degree of *cold* that has exiſted in that interval.

It is evident, that this inſtrument, from its conſtruction, muſt require rectification daily. This is eaſily effected by the following ingenious contrivance. The Author only applies a ſmall magnet to that part of the tube againſt which the index reſts; by the action of which, the included piece of ſteel wire (and conſequently the index) is eaſily brought down to the ſurface of the mercury. When this has been done, the inſtrument is rectified for the next day's obſervation; without heating, cooling, ſeparating, or at all diſturbing the mercury, or moving the inſtrument.

The conſtruction of this inſtrument appears to be difficult; but it has been executed by the Author, who informs us in a note, that 'with a thermometer of this ſort, he obſerved the greateſt heat and cold that happened every day and night throughout the year 1781.'—Other, and ſomewhat ſimilar conſtructions are likewiſe deſcribed; in which the above mentioned thermometer is, as it were, divided into two ſeparate parts; one of which only ſhews the greateſt degree of heat, and the other the greateſt degree of cold.

Article

Article 3. *Obſervations on the Bills of Mortality at York:* By William White, M. D. F. A. S. &c.

According to the Author, it appears evident from other undeniable proofs, as well as thoſe here exhibited, that this nation, both with reſpect to population and healthfulneſs, is in a general and progreſſive courſe of improvement; and that the births have become more numerous, and the deaths fewer, in proportion, in almoſt every place where the regiſters have been conſulted. At York, at leaſt, where there is little increaſe or decreaſe of the people by acquiſition, or emigration, theſe ſymptoms of improvement appear very conſpicuous and evident. Among the general cauſes of increaſe and healthineſs the Author enumerates the introduction of inoculation, the cool regimen in fevers, and the admiſſion of freſh air, the general uſe of antiſeptic medicines and diet, and the more judicious management of children.

Article 4. *Account of a Monſtrous Birth:* By John Torleſe, Eſq; Chief of Anjingo, &c.

This monſtrous production conſiſted of two children that lived above three days, having only one body in common, and diſtinguiſhed by other peculiarities; ſuch as that 'one head would ſleep, whilſt the other was awake; or one would cry, and the other not.' A plate accompanies this ſhort Article.

Article 5. *Experiments with Chineſe Hemp Seed:* By Keane Fitzgerald, Eſq.

The few grains of ſeed with which the Author made theſe experiments were not, through accident, ſown till June; though they ought to have been ſown in April. They nevertheleſs vegetated ſtrongly; ſo that many of them, in October, when they came into bloom, meaſured more than 14 feet in height, and 7 inches nearly in circumference; having grown, at different times, nearly 11 inches *per* week. The rough hemp that was peeled from 32 plants, when thoroughly dried, weighed three pounds and a quarter; though they were not ſuppoſed to have come to full maturity. At the Author's requeſt, the Directors of the Eaſt India Company have promiſed to give orders to their factors to procure and ſend over hither a ſufficient quantity of the beſt ſeed, that can be obtained in China, of this valuable plant.

The remaining Articles (excluſive of the Mathematical and Aſtronomical Papers) are—Article 7. *An Extract of the Regiſter of the Pariſh of Holy Croſs, Salop:* By the Rev. Mr. William Gorſuch, Vicar. Art. 9. *Quantity of Rain which fell at Barrowby, near Leeds:* By George Lloyd, Eſq; F. R. S. Art. 17. *Abſtract of a Regiſter of the Barometer, &c. at Lyndon, in Rutland, 1780:* By Thomas Barker, Eſq.: and Art. 18. The *Meteorological Journal of the Society.*

Art.